

POTENTIAL ROLE OF PLANT-SOIL FEEDBACK IN OAK REGENERATION DECLINE

Sarah McCarthy-Neumann, Katherine E.A. Wood, and Richard K. Kobe

Plant-soil feedbacks (PSFs) could exacerbate the decline of oaks (*Quercus* spp.) (associated with ectomycorrhizal fungi [EMF]) as mesophytic species such as red maple (*Acer rubrum*) (associated with arbuscular mycorrhizal fungi [AMF]) increase in abundance. To test this hypothesis, we carried out a greenhouse experiment where we grew seedlings of five temperate tree species under soils cultured by conspecific versus heterospecific adults at low and high light availability and assessed survival after 12 weeks. We found that negative PSF experienced by seedlings associating with AMF almost always occurred when they were compared with heterospecific adults associating with EMF. Conversely, positive PSF experienced by EMF seedlings occurred when compared to soils cultured by AMF adults. Although PSF occurred regardless of light level, the magnitude of the effect—negative for AMF and positive for EMF seedlings—was greatest at low light. Our results suggest that mesophytic species that are associated with AMF will have greater survival near oak adults (which are associated with EMF) due to the negative PSFs these species experience when establishing under conspecific crowns relative to establishing near oak adults. Likewise, oak establishment is reduced as the abundance of canopy adults of these AMF-associated mesophytic species increases, resulting in fewer areas for oaks to disperse associated with EMF, where oak seedlings experienced enhanced survival.

Sarah McCarthy-Neumann, Department of Environmental Science, Tennessee State University, Nashville, TN 37209, USA

Katherine E.A. Wood, Department of Forestry, Michigan State University, East Lansing, MI 48824, USA

Richard K. Kobe, Department of Forestry, Michigan State University, East Lansing, MI 48824, USA